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(54) ABRASION RESISTANT TEXTILE SLEEVE, IMPROVED MULTIFILAMENT YARN THEREFOR AND METHODS OF CONSTRUCTION THEREOF

ABRIEBFESTE TEXTILHÜLSE, VERBESSERTES MULTIFILAMENTGARN DAFÜR UND VERFAHREN ZUR KONSTRUKTION DAVON

MANCHON TEXTILE RÉSISTANT À L'ABRASION, FIL MULTIFILAMENT AMÉLIORÉ CORRESPONDANT ET PROCÉDÉS DE CONSTRUCTION ASSOCIÉS

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Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] This invention relates generally to textile sleeves for protecting elongate members, and more particularly to abrasion resistant, flexible textile sleeves and to methods of construction thereof.

2. Related Art

[0002] It is known to wrap elongate members in protective sleeves to provide protection to elongate members contained therein against abrasion and contamination. Unfortunately, although known sleeves can be effective at providing such protection to elongate members against abrasion and contamination, they typically have a relative high fabric density, due to the need for increased amounts of yarn material to provide the desired protection against both abrasion and contamination, thereby adding cost, bulk, stiffness and weight to the sleeve. An example of a method for producing fabric having at least one monofilament or monofilament weft thread of highly shrinkable material and warp threads of low-shrinkage material is disclosed in earlier patent application DE 102007023062 A1. An example of a woven textile which when heat is applied spontaneously forms into a tube with overlap in the circumferential direction is disclosed in earlier patent application EP 2647749 A1. An example of a woven fiberglass cable wrap for protecting a communications cable is disclosed in earlier patent application US 6003565 A and an example of a tubular cover to house wires in an automobile is disclosed in earlier patent application WO 2014/034799 A1.

SUMMARY OF THE INVENTION

[0003] According to one aspect of the invention, there is provided an abrasion resistant, flexible textile sleeve for routing and protecting an elongate member contained therein from exposure to abrasion, as recited in the appended claims. The sleeve has a wall extending lengthwise along a longitudinal axis between opposite ends, wherein the wall is configured to bound a cavity, in which the elongate member is contained and protected. The wall is constructed, at least in part, from improved multifilament yarn, which enhances the abrasion resistance of the sleeve wall, while also allowing the fabric density of the wall to remain relatively low, given the degree of abrasion resistance provided, thereby reducing cost, weight and the outer envelope of the sleeve, while also enhancing the flexibility of the sleeve. The improved multifilament yarn includes a plurality of fibers and/or filaments, referred to hereafter for convenience as filaments (being distinguishable by length, with filaments being much longer than fibers, and can extend the entire length of the yarn as continuous, unbroken members, in contrast to much shorter fibers), with at least some of the filaments being provided as "low-melt" filaments and with at least some of the filaments being provided as "standard," "non-low-melt" filaments. By "low-melt" it will be recognized by one skilled in the art that the low-melt fibers melt, at least in part, at a lower temperature as compared to the standard melt temperature fibers, if the standard filaments are capable of melting at all. As such, during production of the sleeve, upon forming the textile, interlaced wall of the sleeve, the wall is subjected to a predetermined heat treatment process, whereupon the low-melt filaments are caused to melt, at least in part, while the standard melt temperature filaments remain entirely or substantially unmelted. The at least partially melted low-melt filaments act as glue to bond all the filaments, including the standard, non-low-melt temperature filaments, of the multifilament yarn to one another. Accordingly, the individual filaments are prevented or inhibited from moving in sliding relation relative to one another, which in turn reduces the abrasion between the individual filaments of the multifilament yarn, thus improving the resistance of the sleeve wall to wear from abrasion. However, although the melted filaments are bonded to one another, the filaments, and wall formed thereby, remain highly flexible, thereby allowing the resulting sleeve to be routed about meandering paths and corners. As such, with the sleeve wall remaining substantially un-abraded in use, the elongate members contained therein are optimally protected against external sources of abrasion and contamination. The heat-set filaments are integrally provided in the improved multifilament yarns.

[0004] In accordance with another aspect of the invention, the textile sleeve may be constructed as a woven, knit or braided sleeve.

[0005] In accordance with the invention, the opposite edges are biased into overlapping relation with one another via heat-set, circumferentially extending yarn.

[0006] In accordance with another aspect of the invention, the improved multifilament yarn includes about 1%-90% low-melt filament content.

[0007] In accordance with another aspect of the invention, the improved multifilament yarn can have a denier ranging between about 150-20000, as a single or multiply yarn.

[0008] In accordance with the invention, the improved multifilament yarn includes at least one or a plurality heat-settable monofilaments.

[0009] In accordance with another aspect of the invention, the improved multifilament yarn can include a plurality of low-melt filaments and a plurality of standard melt filaments, wherein the individual filaments can be combed with one another to extending substantially parallel with one another.

[0010] In accordance with another aspect of the invention, the improved multifilament yarn can include at least one low-melt filament and at least one standard melt filament twisted with one another.

[0011] In accordance with another aspect of the invention, the improved multifilament yarn can include a plurality of low-melt filaments and a plurality of standard melt filaments braided with one another.

[0012] In accordance with another aspect of the invention, the improved multifilament yarn can include a plurality of low-melt filaments and a plurality of standard melt filaments air-texturized with one another.

[0013] In accordance with another aspect of the invention, the improved multifilament yarn can include a plurality of low-melt filaments and a plurality of standard melt filaments twisted and texturized with one another.

[0014] In accordance with another aspect of the invention, there is provided a method of constructing an abrasion resistant textile sleeve for routing and protecting an elongate member contained therein from exposure to abrasion and contamination, as recited in the appended claims. The method includes forming a textile wall extending lengthwise along a longitudinal axis between opposite ends at least in part from improved multifilament yarn, formed in accordance with one aspect of the invention. The improved multifilament yarn is provided including a plurality of filaments, with at least some of the filaments being provided as "low-melt" filaments and with at least some of the filaments being provided as "standard" melt temperature filaments, if they melt at all. Then, upon forming the textile wall of the sleeve, the method includes heat-treating the sleeve and causing the low-melt filaments to melt, at least in part, while avoiding or substantially avoiding melting the standard melt temperature filaments, thereby causing all the filaments within the improved multifilament yarn to be bonded to one another via the at least partially melted low-melt filaments. The method further includes heat-setting filaments within said improved multifilament yarns.

[0015] In accordance with another aspect of the invention, the method of constructing the sleeve includes weaving, knitting or braiding the wall of the sleeve.

[0016] In accordance with the invention, the method of constructing the sleeve includes biasing the opposite edges into overlapping relation with one another via heat-setting circumferentially extending yarn. The opposite edges can be biased during the heat-treating process used to melt the low-melt filaments.

[0017] In accordance with the invention, the method of constructing the sleeve includes heat-setting at least one or a plurality of heat-settable yarns contained within the improved multifilament yarn.

[0018] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn having a denier ranging between about 150-20000, as a single or multiply yarn.

[0019] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn including a plurality of low-melt filaments and a plurality of standard melt filaments, wherein the individual filaments can be combed with one another to extending substantially parallel with one another.

[0020] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn including at least one low-melt filament and at least one standard melt filament twisted with one another.

[0021] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn including a plurality of low-melt filaments and a plurality of standard melt filaments braided with one another.

[0022] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn including a plurality of low-melt filaments and a plurality of standard melt filaments air-texturized and intermingled with one another.

[0023] In accordance with another aspect of the invention, the method of constructing the sleeve can include providing the improved multifilament yarn including a plurality of low-melt filaments and a plurality of standard melt filaments twisted and texturized with one another.

[0024] In accordance with another aspect of the invention, the improved multifilament yarn includes providing the low-melt filaments content to be between about 1-90wt%.

[0025] In accordance with another aspect of the invention, the improved multifilament yarn includes forming the improved multifilament having a denier ranging between about 150-20000, as a single or multiply yarn.

[0026] In accordance with another aspect of the invention, the improved multifilament yarn includes combining a pre-existing multifilament comprising entirely or substantially standard melt temperature filaments with a pre-existing multifilament comprising entirely or substantially low-melt temperature filaments.

[0027] In accordance with another aspect of the invention, the pre-existing multifilament of standard melt temperature filaments with the pre-existing multifilament of low-melt temperature filaments can include an intermingling, twisting, texturizing, serving, cabling or similar process.

[0028] In accordance with another aspect of the invention, the improved multifilament yarn can include combing at least one heat-settable filament with the low-melt filaments and the standard melt filaments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] These and other aspects, features and advantages will become readily apparent to those skilled in the art in view of the following detailed description of presently preferred embodiments and best mode, appended claims, and accompanying drawings, in which:

Figures 1A-1C are schematic perspective views of textile sleeves constructed in accordance with vari-

ous aspects of the invention shown carrying and protecting an elongate member therein;

Figures 2A-2C are schematic perspective views of textile sleeves shown carrying and protecting an elongate member therein; and

Figures 3A-3F are an enlarged partial schematic views of improved multifilament yarns used, at least in part, to construct the sleeves of Figures 1A-1C and 2A-2C.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0030] Referring in more detail to the drawings, Figures 1A-1C show schematic representations of textile sleeves, referred to hereafter as sleeve 10, constructed in accordance with various aspects of the invention. The sleeve 10 is shown having a wrappable elongate wall 12 for routing and protecting an elongate member 14, such as wires, a wire harness, or tube, for example, from exposure to abrasion and the ingress of contamination, debris and the like. The elongate wall 12 has opposite edges 16, 18 extending lengthwise along a longitudinal, central axis 20 between opposite ends 15, 17, wherein the edges 16, 18 are configured to be wrapped into overlapping relation with one another in "cigarette wrapped" fashion to fully enclose the elongate member 14 within a central cavity 22 of the sleeve 10. The cavity 22 is readily accessible along the full length of the central axis 20 so that the elongate member 14 can be readily disposed radially into the cavity 22, and conversely, removed from the cavity 22, such as during service. The opposite edges 16, 18 can be biased into overlapping relation with one another via heat-set, circumferentially extending yarn, if desired. To provide protection to the elongate member 14 against abrasion and contamination, and to enhance the ability of the wall 12 to resist being abraded, the wall 12 is constructed, at least in part, with improved multifilament yarn 24 (Figures 3A-3F show various versions, though it is to be understood the appearance can be different depending on the mechanism used to form the yarn 24, e.g. intermingling, twisting, texturizing, serving, cabling or similar process), via one of a weaving (Figure 1A), braiding (Figure 1B) or knitting (Figure 1C) process.

[0031] Depending on the application needs, the wall 12 can be constructed having any suitable size, including length, width and diameter. If the wall 12 is heat-set and brought into a self-wrapped tubular configuration, generally free from any externally applied forces, the edges 16, 18 preferably overlap one another at least slightly to fully enclose the cavity 22, and thus, provide enhanced protection to the elongate member 14 contained in the cavity 22. The lengthwise edges 16, 18 are readily extendable away from one another under an externally applied force sufficient to overcome the bias imparted by the heat-settable monofilaments 30 of polymeric material monofilament, such as polyphenylene sulfide (PPS) or polyethyleneterephthalate (PET), for example, to at least partially open and expose the cavity 22. Accordingly, the elongate member 14 can be readily disposed into the cavity 22 during assembly or removed from the cavity 22 during service. Upon releasing the externally applied force, the edges 16, 18 return automatically to their overlapping, self-wrapped position under the bias imparted by the heat-set fill monofilament yarns 30.

[0032] The improved multifilament yarn 24 includes a plurality of filaments, with at least some of the filaments being provided as "low-melt" filaments 26 and with at least some of the filaments being provided as "standard" melt temperature filaments 28. By "low-melt" it will be recognized by one skilled in the art that the low-melt filaments 26 melt, at least in part, at a lower temperature, such as between about 100-200 °C, by way of example and without limitation, as compared to the standard melt temperature filaments 28, such as between about 260-280 °C, by way of example and without limitation, if at all. As such, upon forming the textile wall 12 of the sleeve 10, the sleeve 10 can be heat-treated at a temperature sufficient to at least partially melt the low-melt filaments 26, but low enough to avoid melting the standard filaments 28, whereupon the at least partially melted low-melt filaments 26 act as glue to bond all the filaments, including the standard melt temperature filaments 28, of the improved multifilament 24 to one another. Accordingly, the individual filaments 26, 28 are prevented or inhibited from moving relative to one another, which in turn reduces the friction and abrasion between the individual filaments 26, 28 of the improved multifilament 24, thus improving the resistance of the sleeve wall 12 to abrasion, and preventing the individual filaments 26, 28 from being separated and penetrated or otherwise broken by an external abradant source. Further, with the standard filaments 28 remaining unmelted, they retain their full tenacity and functionality, thereby further enhancing the protective shielding coverage and abrasion resistance of the wall 12, while minimizing the amount of yarn material needed to provide the desired protection, thus, minimizing the bulk, weight and outer envelope of the sleeve 10. Some non-limiting examples of types of low-melt filaments 26 and standard filaments 28 include, respectively; low-melt/polyethylene terephthalate (PET); polypropylene (PP)/PET; low-melt/Nomex®; PP/Nomex®; PET/Nomex®; low-melt/fiberglass; PP/fiberglass; polyethylene (PE)/fiberglass, by way of example and without limitation. The low-melt material can be any desired low-melt polymeric material, including a homopolymer, such as polypropylene, polyethylene, etc., or a copolymer, such as copolyester, copolyamide, in the form of a multifilament yarn or mono-component containing or bicomponent containing multifilament yarn. Some additional standard filaments 28 may include thermoset fibers, mineral fibers, or metallic yarn, and acrylic fibers, cotton fibers, rayon fibers, and fire retardant (FR) versions of all the aforementioned fiber materials, by way of example and without limitation. It should be recognized that the heat-treating process could be used to heat-set

the heat-settable, circumferentially extending yarn of monofilaments 30, if desired, thereby performing multiple functions in a single heat-treating, heat-setting process.

[0033] In one exemplary sleeve embodiment, the improved multifilament yarns 24 were provided as warp yarns in the wrappable sleeve 10 of Figure 1, having a denier of about 1250. The improved multifilament yarns 24 were formed from low-melt multifilament filaments 26 having a denier of about 150 combined with standard multifilament filaments 28 having a denier of about 1100, whereupon combining the two multifilament yarns 26, 28, the resulting improved multifilament yarn 24 has a substantially uniform, homogenous cross-sectional content of the different materials of the two different multifilament yarns 26, 28. The sleeve 10 was further constructed having a warp density between about 20-30 end/inch, while the weft density was between about 15-25 picks/inch from monofilaments 30 of about 0.22mm diameter PET, by way of example and without limitation. Then, upon forming the wall 12, the wall 12 was wrapped to bring the opposite edges 16, 18 into overlapping relation with one another and heat-treated in a single heating process, at a suitable temperature, to both heat-set the weft monofilaments 30, thereby maintaining the wall 12 in its wrapped configuration, and also melt the low-melt fibers 26 within the improved multifilament 24, thereby bonding all the filaments 26, 28 of the improved multifilament yarn 24 together via the melted material. The weave used to form the wall can be any desired weave pattern, such as a plain weave pattern; however, other weave patterns are contemplated herein, such as twill, basket, satin or sateen, by way of example.

[0034] In Figures 2A-2C, textile sleeves 10' that are beyond the scope of the invention are shown, wherein the same reference numerals as used above with regard to the sleeve 10, differentiated by a prime symbol ('), are used to identify like features. The sleeve 10' is similar to the sleeve 10; however, rather than having an open wall, the wall 12' of the sleeve 10' is circumferentially continuous and seamless, sometimes referred to as a "closed" wall bounding a central cavity 22' that extends between opposite ends 15', 17'. The sleeve 10' can be constructed using the same types of construction, i.e. weaving (Figure 2A), braiding (Figure 2B), knitting (Figure 2C), as discussed above for the sleeve 10, and including the improved multifilaments 24 and optionally other yarns, as discussed above, such as the standard melt temperature multifilaments and/or monofilaments of any material type, as desired. It should be recognized that any sleeve constructed in accordance with the invention is constructed of a combination of the improved multifilament yarns 24 and at least the aforementioned heat-settable monofilaments 30, and that it further can include other types of yarn, including the aforementioned standard melt temperature multifilaments. It should further be understood that the improved multifilament yarns 24 can be used in either, or both, warp and weft directions, and as desired in one or both S and Z directions of a braided sleeve construction.

[0035] In accordance with another aspect of the invention, a method of constructing an improved multifilament yarn 24 is provided. The method includes forming the improved multifilament yarn 24 with a plurality of filaments, with at least some of the filaments being provided as "low-melt" filaments 26 and with at least some of the filaments being provided as "standard" melt temperature filaments 28, if meltable at all, meaning they could be essentially non-meltable, such as the case with mineral type yarns, for example. It should be recognized that the different types of filaments 26, 28 are separately formed filaments, and thereafter, combined with one another, via one of the various mechanisms disclosed herein, such as shown in Figures 3A-3E, to form the improved multifilament yarn 24. The low-melt filaments 26 are provided having a first melt temperature, and the standard melt temperature filaments 28 are provided having a second melt temperature, wherein the first melt temperature is lower than the second melt temperature, such as by about 10-1000 °C, such that upon exposing the improved multifilament yarn 24 to a heat source at a temperature at about the first melt temperature, the low-melt filaments 26 at least partially melt, while the second filaments 28 remain unmelted. The low-melt filaments content of the improved multifilament yarn 24 is between about 1-90wt%. The improved multifilament yarn 24 is formed having a denier ranging between about 150-20000, as a single or multiply yarn. The method of constructing the improved multifilament yarn 24 includes combining a pre-existing multifilament comprising entirely or substantially standard melt temperature filaments 28 with a pre-existing multifilament comprising entirely or substantially low-melt temperature filaments 26. The combining process used to combine the low-melt multifilament with the high melt multifilament to form the improved multifilament yarn 24 can include the following, wherein different embodiments of the improved multifilament yarn are identified generally by reference numeral 24, offset by respective prime symbols (', '', ''', '''', '''') to denote different embodiments, though it is to be recognized that any of the embodiments can be used to form a sleeve 10, 10' as discussed above: intermingling/texturizing (Figures 3A-3C), braiding (Figure 3D), twisting (Figure 3E), serving/cabling (Figure 3F), or similar processes, by way of example and without limitation.

[0036] Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that the invention may be practiced otherwise than as specifically described, and that the scope of the invention is defined by claims allowed.

Claims

1. A textile sleeve (10) for routing and protecting an elongate member (14) against abrasion, comprising:

a flexible wall (12) having a plurality of yarns interlaced with one another, at least some of said plurality of yarns being improved multifilament yarns (24"') including low-melt multifilaments (26) and non-low-melt multifilaments (28), said low-melt multifilaments having a first melt temperature and said non-low-melt multifilaments having a second melt temperature, said second melt temperature being greater than said first melt temperature, said low-melt multifilaments being bonded with said non-low-melt multifilaments to prevent relative sliding movement between said low-melt multifilaments and said non-low-melt multifilaments,

wherein said wall has opposite edges (16, 18) extending generally parallel to a central axis (20) between opposite ends (15, 17), with the opposite edges being brought into overlapping relation with one another and said sleeve further including circumferentially extending, heat-set monofilaments (30) biasing said opposite edges into overlapping relation with one another, said heat-set filaments being integrally provided in said improved multifilament yarns (24"').

2. The textile sleeve (10) of claim 1, wherein said low-melt multifilaments (26) and said non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') are twisted with one another.

3. The textile sleeve (10) of claim 1, wherein said low-melt multifilaments (26) and said non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') are combed together to extend generally parallel with one another.

4. The textile sleeve (10) of claim 1, wherein said low-melt multifilaments (26) and said non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') are intertwined with one another.

5. The textile sleeve (10) of claim 1, wherein said low-melt multifilaments (26) and said non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') are braided with one another.

6. The textile sleeve (10) of claim 1, wherein at least some of said low-melt multifilaments (26) and at least some of said non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') are twisted and served with one another.

7. A method of constructing a textile sleeve (10) for routing and protecting an elongate member (14) against abrasion, comprising:

forming a wall (12) having opposite edges (16, 18) extending generally parallel to a central axis (20) between opposite ends (15, 17) by interlacing a plurality of yarns interlaced with one another and providing at least some of said plurality of yarns being improved multifilament yarns (24"') including low-melt multifilaments (26) and non-low-melt multifilaments (28), said low-melt multifilaments having a first melt temperature and said non-low-melt multifilaments having a second melt temperature, said second melt temperature being greater than said first melt temperature;

bonding said low-melt multifilaments with said non-low-melt multifilaments via a heat-treatment process to prevent relative sliding movement between said low-melt multifilaments and said non-low-melt multifilaments; and

bringing the opposite edges into overlapping relation with one another to bound a central cavity (22) by including heat-setting monofilaments (30) within the wall to bias said opposite edges into overlapping relation with one another

further including incorporating the monofilaments (30) within said improved multifilament yarns.

8. The method of claim 7, further including providing the low-melt multifilaments (26) and the non-low-melt multifilaments (28) within each of the improved multifilament yarns as being twisted (24"') with one another.

9. The method of claim 7, further including providing the low-melt multifilaments (26) and the non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') as being combed together in generally parallel relation with one another.

10. The method of claim 7, further including providing the low-melt multifilaments (26) and the non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') as being intertwined with one another.

11. The method of claim 7, further including providing the low-melt multifilaments (26) and the non-low-melt multifilaments (28) within each of said improved multifilament yarns as being braided (24"') with one another.

12. The method of claim 7, further including providing at least some of the low-melt multifilaments (26) and at least some of the non-low-melt multifilaments (28) within each of said improved multifilament yarns (24"') as being twisted and served with one another.

Patentansprüche

1. Textilhülle (10) zum Führen und Schützen eines länglichen Elements (14) vor Abrieb, umfassend:

eine flexible Wand (12), die eine Vielzahl von Garnen aufweist, die miteinander vernetzt sind, wobei zumindest einige aus der Vielzahl von Garnen verbesserte Multifilamentgarne (24"") sind, die niedrigschmelzende Multifilamente (26) und nicht niedrigschmelzende Multifilamente (28) beinhalten, wobei die niedrigschmelzenden Multifilamente eine erste Schmelztemperatur aufweisen und die nicht niedrigschmelzenden Multifilamente eine zweite Schmelztemperatur aufweisen, wobei die zweite Schmelztemperatur größer als die erste Schmelztemperatur ist, wobei die niedrigschmelzenden Multifilamente mit den nicht niedrigschmelzenden Multifilamenten verbunden sind, um relative Gleitbewegung zwischen den niedrigschmelzenden Multifilamenten mit den nicht niedrigschmelzenden Multifilamenten zu verhindern,
wobei die Wand gegenüberliegende Kanten (16, 18) aufweist, die sich im Allgemeinen parallel zu einer Mittelachse (20) zwischen gegenüberliegenden Enden (15, 17) erstrecken, wobei die gegenüberliegenden Kanten in überlappende Beziehung zueinander gebracht sind und die Hülle ferner sich umlaufend erstreckende, wärmegehärtete Monofilamente (30) beinhaltet, welche die gegenüberliegenden Kanten in überlappende Beziehung zueinander vorspannen, wobei die wärmegehärteten Filamente einstückig in den verbesserten Multifilamentgarnen (24"") bereitgestellt sind.

2. Textilhülle (10) nach Anspruch 1, wobei die niedrigschmelzenden Multifilamente (26) und die nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"") miteinander verzwirnt sind.

3. Textilhülle (10) nach Anspruch 1, wobei die niedrigschmelzenden Multifilamente (26) und die nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"") zusammengekämmt sind, um sich im Allgemeinen parallel zueinander zu erstrecken.

4. Textilhülle (10) nach Anspruch 1, wobei die niedrigschmelzenden Multifilamente (26) und die nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"") miteinander verschlungen sind.

5. Textilhülle (10) nach Anspruch 1, wobei die niedrigschmelzenden Multifilamente (26) und die nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"") miteinander verflochten sind.

6. Textilhülle (10) nach Anspruch 1, wobei zumindest einige der niedrigschmelzenden Multifilamente (26) und zumindest einige der nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"") miteinander verzwirnt und bedient sind.

7. Verfahren zum Konstruieren einer Textilhülle (10) zum Führen und Schützen eines länglichen Elements (14) vor Abrieb, umfassend:

Bilden einer Wand (12), die gegenüberliegende Kanten (16, 18) aufweist, die sich im Allgemeinen parallel zu einer Mittelachse (20) zwischen gegenüberliegenden Enden (15, 17) erstrecken, indem eine Vielzahl von miteinander vernetzten Garnen vernetzt wird und zumindest einige aus der Vielzahl von Garnen verbesserte Multifilamentgarne (24"") sind, die niedrigschmelzende Multifilamente (26) und nicht niedrigschmelzende Multifilamente (28) beinhalten, wobei die niedrigschmelzenden Multifilamente eine erste Schmelztemperatur aufweisen und die nicht niedrigschmelzenden Multifilamente eine zweite Schmelztemperatur aufweisen, wobei die zweite Schmelztemperatur höher als die erste Schmelztemperatur ist;
Verbinden der niedrigschmelzenden Multifilamente mit den nicht niedrigschmelzenden Multifilamenten über einen Wärmebehandlungsprozess, um relative Gleitbewegung zwischen den niedrigschmelzenden Multifilamenten und den nicht niedrigschmelzenden Multifilamenten zu verhindern; und
Bringen der gegenüberliegenden Kanten in überlappende Beziehung zueinander, um einen zentralen Hohlraum (22) zu begrenzen, indem wärmehärtende Monofilamente (30) in die Wand aufgenommen werden, um die gegenüberliegenden Kanten in überlappende Beziehung zueinander vorzuspannen
ferner beinhaltend das Einbringen der Monofilamente (30) innerhalb der verbesserten Multifilamentgarne.

8. Verfahren nach Anspruch 7, ferner beinhaltend das Bereitstellen der niedrigschmelzenden Multifilamente (26) und der nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne, wenn sie miteinander verzwirnt (24"") sind.

9. Verfahren nach Anspruch 7, ferner beinhaltend das Bereitstellen der niedrigschmelzenden Multifilamen-

te (26) und der nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"') als in im Allgemeinen paralleler Beziehung zueinander zusammengekämmt.

10. Verfahren nach Anspruch 7, ferner beinhaltend das Bereitstellen der niedrigschmelzenden Multifilamente (26) und der nicht niedrigschmelzenden Multifilamente (28) in jedem der verbesserten Multifilamentgarne (24"') als miteinander verschlungen.

11. Verfahren nach Anspruch 7, ferner beinhaltend das Bereitstellen der niedrigschmelzenden Multifilamente (26) und der nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne, als miteinander verflochten (24"').

12. Verfahren nach Anspruch 7, ferner beinhaltend das Bereitstellen von zumindest einigen der niedrigschmelzenden Multifilamente (26) und zumindest einigen der nicht niedrigschmelzenden Multifilamente (28) innerhalb jedes der verbesserten Multifilamentgarne (24"') als miteinander verzwirnt und bedient.

Revendications

1. Manchon textile (10) destiné à acheminer et protéger un élément allongé (14) contre l'abrasion, comprenant :

une paroi souple (12) possédant une pluralité de fils entrelacés les uns avec les autres, au moins certains de ladite pluralité de fils étant des fils multifilaments améliorés (24"') comprenant des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un bas point de fusion (28), lesdits multifilaments à bas point de fusion possédant une première température de fusion et lesdits multifilaments ne présentant pas un bas point de fusion possédant une seconde température de fusion, ladite seconde température de fusion étant supérieure à ladite première température de fusion, lesdits multifilaments à bas point de fusion étant liés auxdits multifilaments ne présentant pas un bas point de fusion pour empêcher un mouvement de glissement relatif entre lesdits multifilaments à bas point de fusion et lesdits multifilaments ne présentant pas un bas point de fusion,
ladite paroi possédant des bords opposés (16, 18) s'étendant globalement parallèle à un axe central (20) entre des extrémités opposées (15, 17), les bords opposés étant amenés dans une relation de chevauchement l'un avec l'autre et ledit manchon comprenant en outre des monofilaments thermodurcis s'étendant circonférentiellement (30) sollicitant lesdits bords opposés dans une relation de chevauchement l'un avec l'autre, lesdits filaments thermodurcis étant intégralement fournis dans lesdits fils multifilaments améliorés (24"').

2. Manchon textile (10) selon la revendication 1, lesdits multifilaments à bas point de fusion (26) et lesdits multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"') étant torsadés les uns avec les autres.

3. Manchon textile (10) selon la revendication 1, lesdits multifilaments à bas point de fusion (26) et lesdits multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"') étant peignés ensemble pour s'étendre globalement parallèles les uns aux autres.

4. Manchon textile (10) selon la revendication 1, lesdits multifilaments à bas point de fusion (26) et lesdits multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"') étant entrelacés les uns avec les autres.

5. Manchon textile (10) selon la revendication 1, lesdits multifilaments à bas point de fusion (26) et lesdits multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"') étant tressés les uns avec les autres.

6. Manchon textile (10) selon la revendication 1, au moins certains desdits multifilaments à bas point de fusion (26) et au moins certains desdits multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"') étant torsadés et servis les uns avec les autres.

7. Procédé de construction d'un manchon textile (10) destiné à acheminer et à protéger un élément allongé (14) contre l'abrasion, comprenant :

la formation d'une paroi (12) possédant des bords opposés (16, 18) s'étendant globalement parallèles à un axe central (20) entre des extrémités opposées (15, 17) en entrelaçant une pluralité de fils entrelacés les uns avec les autres et en fournissant au moins certains de ladite pluralité de fils qui sont des fils multifilaments améliorés (24"') comprenant des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un bas point de fusion (28), lesdits multifilaments à bas point de fusion possédant une première température de fusion et les-

dits multifilaments ne présentant pas un bas point de fusion possédant une seconde température de fusion, ladite seconde température de fusion étant supérieure à ladite première température de fusion ;
la liaison desdits multifilaments à bas point de fusion avec lesdits multifilaments ne présentant pas un bas point de fusion par l'intermédiaire d'un procédé de traitement thermique pour empêcher un mouvement de glissement relatif entre lesdits multifilaments à bas point de fusion et lesdits multifilaments ne présentant pas un bas point de fusion ; et
l'entraînement des bords opposés dans une relation de chevauchement l'un avec l'autre pour délimiter une cavité centrale (22) en comprenant des monofilaments thermodurcis (30) à l'intérieur de la paroi pour solliciter lesdits bords opposés dans une relation de chevauchement l'un avec l'autre comprenant en outre l'incorporation des monofilaments (30) dans lesdits fils multifilaments améliorés.

8. Procédé selon la revendication 7, comprenant en outre la fourniture des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un point de fusion (28) à l'intérieur de chacun des fils multifilaments améliorés de façon à être torsadés (24"") les uns avec les autres.

9. Procédé selon la revendication 7, comprenant en outre la fourniture des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"") de façon à être peignés ensemble dans une relation globalement parallèle les uns avec les autres.

10. Procédé selon la revendication 7, comprenant en outre la fourniture des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"") de façon à être entrelacés les uns avec les autres.

11. Procédé selon la revendication 7, comprenant en outre la fourniture des multifilaments à bas point de fusion (26) et des multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés de façon à être tressés (24"") les uns avec les autres.

12. Procédé selon la revendication 7, comprenant en outre la fourniture d'au moins certains des multifilaments à bas point de fusion (26) et au moins certains des multifilaments ne présentant pas un bas point de fusion (28) à l'intérieur de chacun desdits fils multifilaments améliorés (24"") de façon à être torsadés et servis les uns avec les autres.

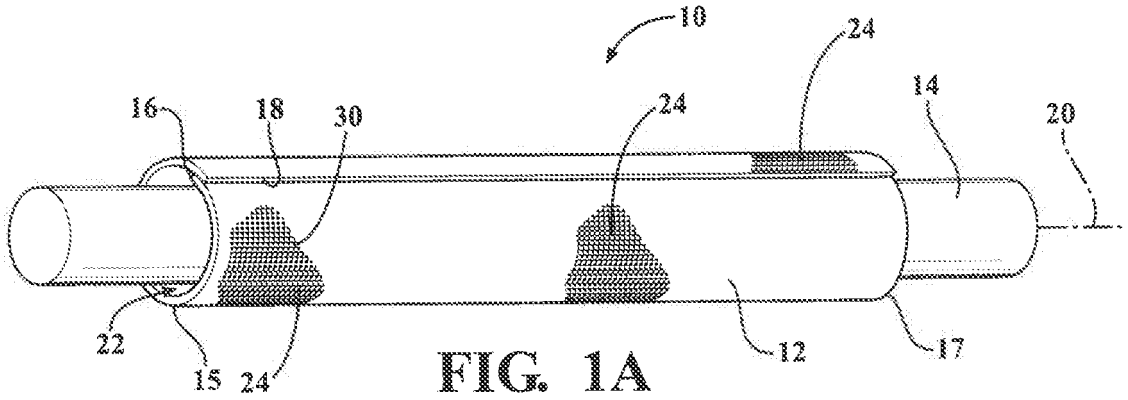

FIG. 1A

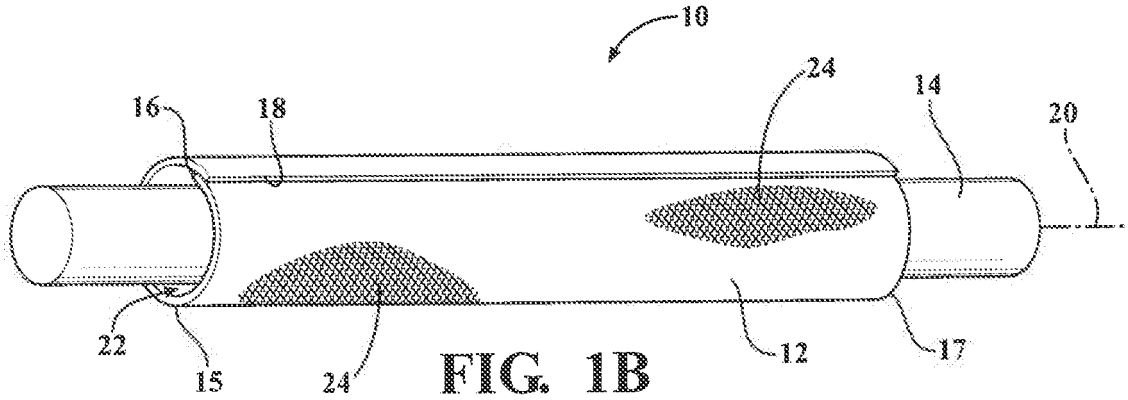

FIG. 1B

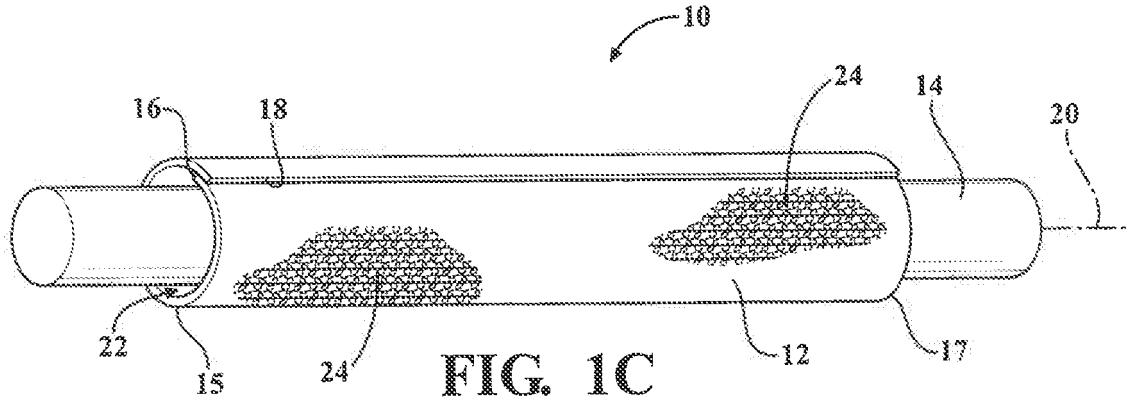

FIG. 1C

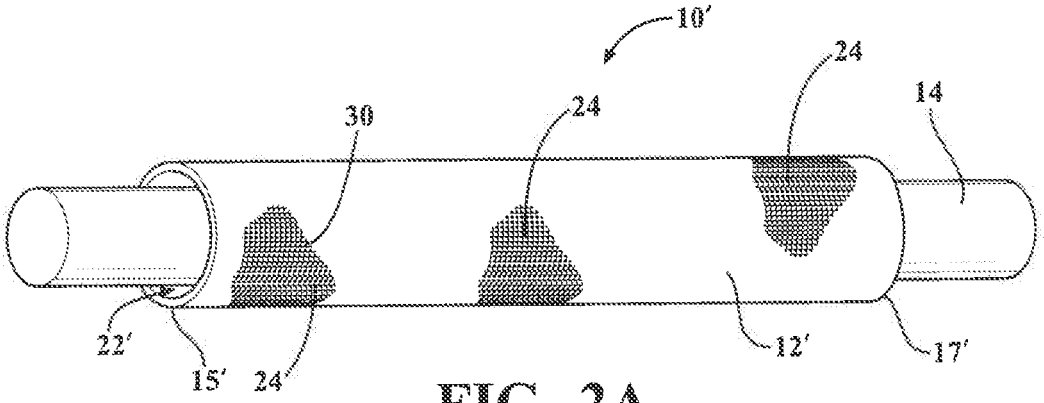

FIG. 2A

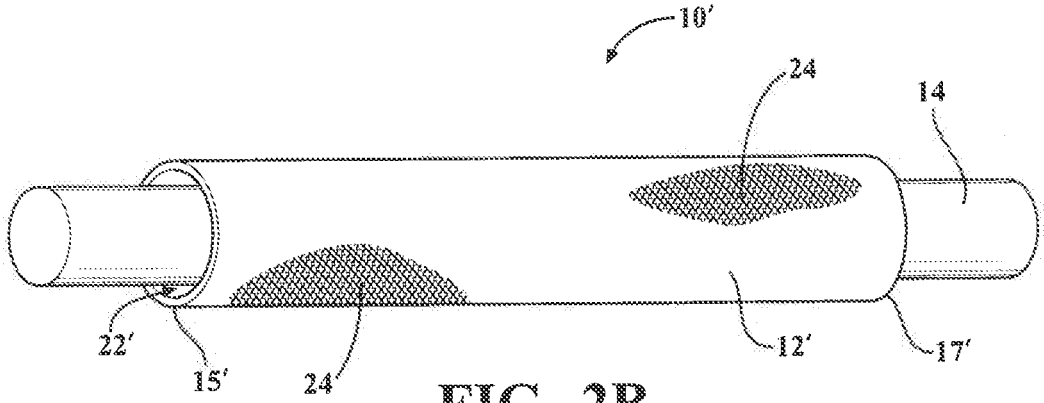

FIG. 2B

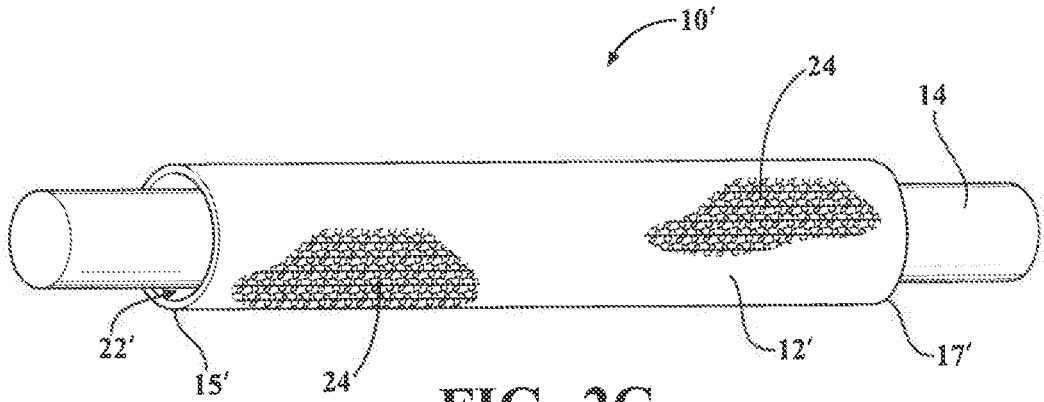

FIG. 2C

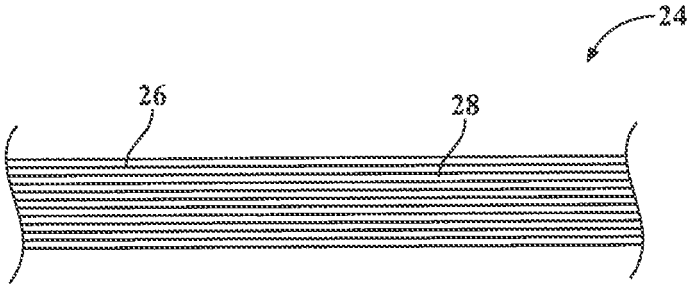

FIG. 3A

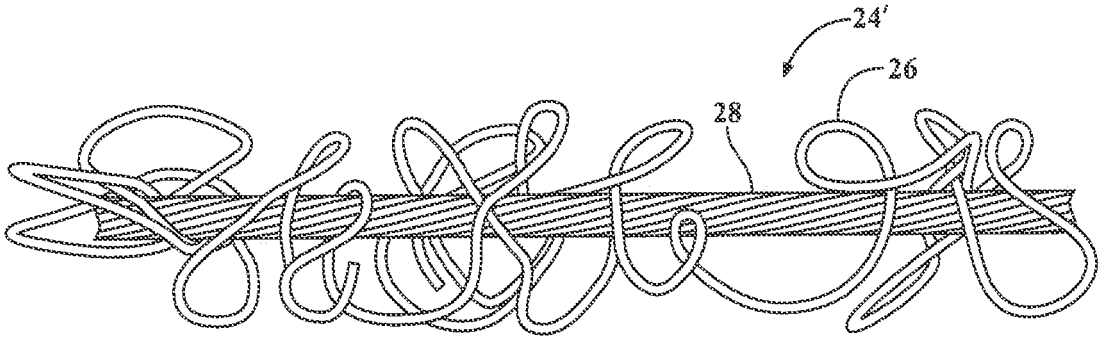

FIG. 3B

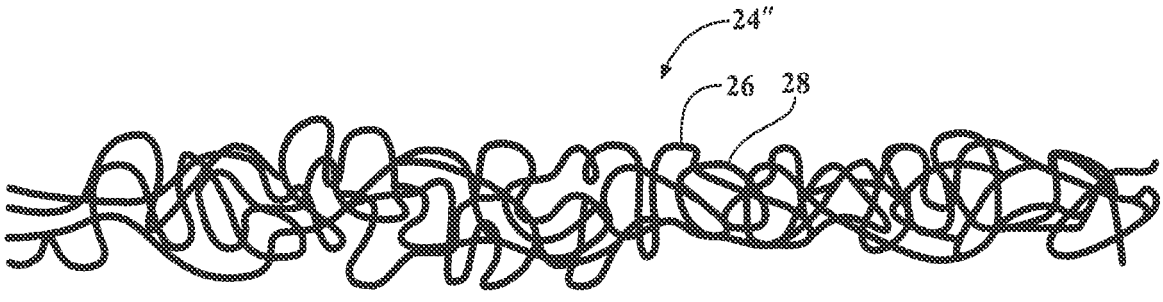

FIG. 3C

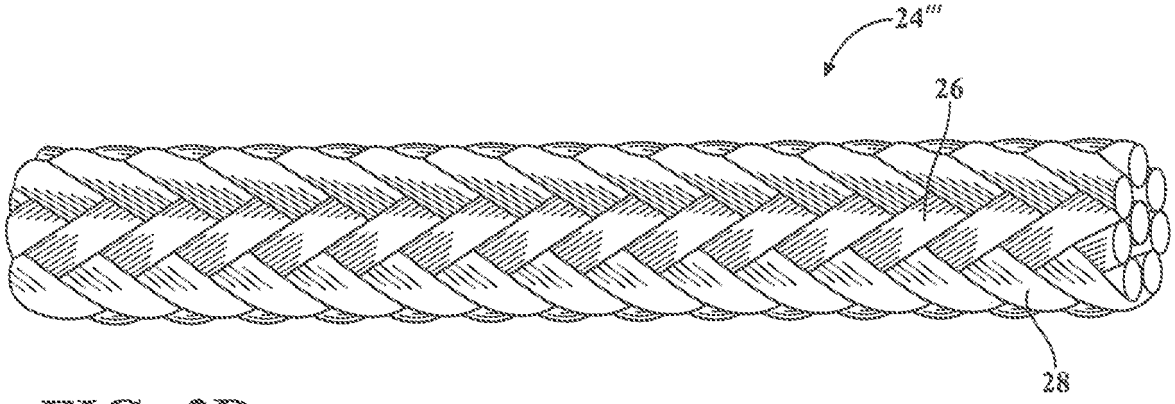

FIG. 3D

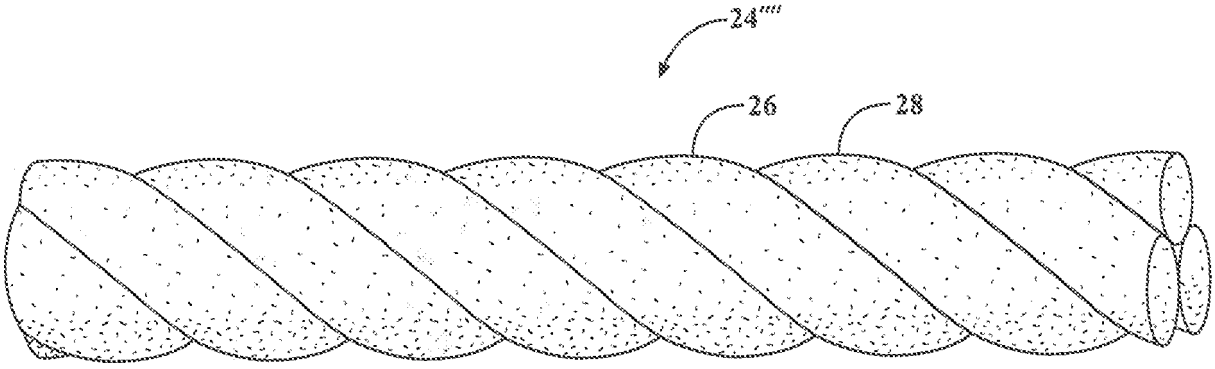

FIG. 3E

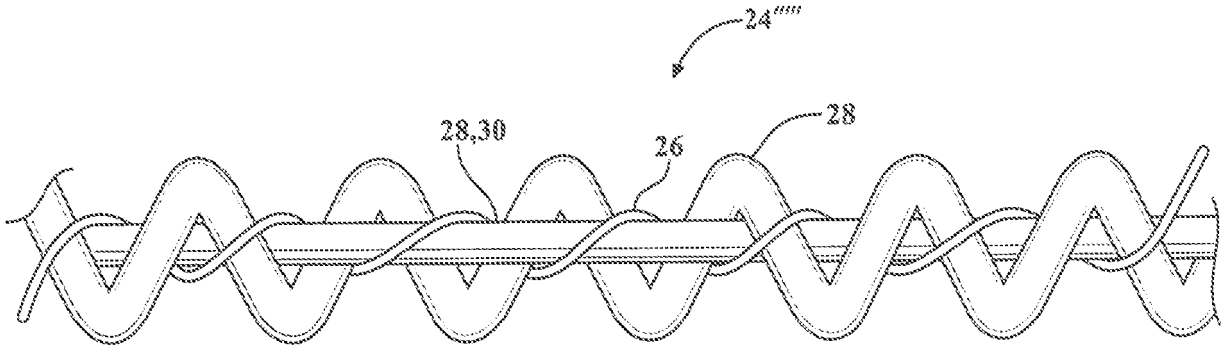

FIG. 3F

REFERENCES CITED IN THE DESCRIPTION

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